UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

February 14, 1994

Reply To
Attn Of: HW-124

Ms. Lisa Green, Deputy Director
Environmental Restoration Division
Department of Energy
Idaho Field Office
785 DOE Place
Idaho Falls, Idaho 83401-1562

Re: INEL OU 7-08
Draft Final RI/FS Report

Dear Ms. Green:

In a January 18, 1994 submittal you provided the Environmental Protection Agency (EPA) a draft final RI/FS Report for the Organic Contamination in the Vadose Zone (OU 7-08). EPA has reviewed the Report and has enclosed comments.

As I have discussed with DOE's WAG manager, EPA has not identified "disputable" issues in the draft final RI/FS, and since the State of Idaho has arrived at a similar conclusion, we expect the RI/FS to become final at the end of the 30 day review period. It is our preference that the comments provided in the enclosure be addressed during early discussions about the Remedial Design (i.e., in preparing the RD/RA SOW). If you or your staff have any questions about the comments, please contact me at (206) 553-1743.

Sincerely,

Ed Jones, WAG 10 Manager
Federal Facility Section I

Enclosure

cc: D. Nygard, IDHW
D. Koch, IDHW
C. Strong, Geotech
J. Lyle, DOE
P. Cleary, DOE
M. Nearman, EPA

GENERAL COMMENTS

1. The radio frequency (RF) heating-enhanced VVE alternative has not been chosen by DOE as the preferred remedial alternative. EPA agrees that at this juncture the phased VVE system without enhancement appears more cost-effective. If, however, enhancement is chosen in the ROD (or installed in the future as part of the VVE phase-up) it should be noted that this option has not been fully evaluated in the FS in terms of removal rate, reduction in remediation times, and cost difference compared to other alternatives. DOE states that a lack of site-specific data hinders the ability to gauge these parameters for this site. While a precise estimate of the effect of RF heating-enhanced VVE on parameters such as removal rate, time, and cost may not be possible, it is possible to describe effects noted at similar sites. If this technology has not been applied to sufficiently similar sites, it may be more accurate to state that a given effect is uncertain.

In addition, the plan to add a single gas monitoring well to the RF heating-enhanced VVE alternative is probably insufficient to monitor the fate and transport potential of this alternative. Three to four wells, positioned at the perimeter, is preferable, with the contingency to add more if transport is occurring.

In the design of this system, two particular items should be considered: (1) the vapor extraction rate should be linked to the anticipated vapor generation rate; and, (2) the type of soils and the presence of metals (such as wells or drums) may adversely affect the effectiveness of the technology. Sealed containers may explode if volatile contents are heated using this method.

2. DOE has acknowledged that the 2-year period used in phasing the VVE option lacks quantifiable support. It should be noted, however, that the removal rate has been observed to stabilize at other sites in 2 to 3 months (Johnson et al. 1990). This may be a sufficient operating time to estimate the total time before preliminary remediation goals (PRGs) are met.

A pilot study of VVE was done for this OU, and the data from the study should be used to support remedial timeframes and phasing periods. If the pilot study data do not support the proposed periods, then the periods should be adjusted during RD.

3. PRGs. According to the text, soil vapor PRGs in the FS are derived from drinking water MCLs. Although this back-calculating approach to determining cleanup levels for soil vapor is valid, the actual groundwater concentrations should ultimately be the measure of the adequacy of soil vapor clean-up.

EPA's view is that the reliability of the model used in the RI is questionable, and using it to develop PRGs for soil vapor may result in improper cleanup levels (i.e., either insufficiently protective, or overly protective of groundwater quality). Once RD has been initiated, the Agency expects that the model will be refined, or replaced, and that a goal of whatever action we take will be to make future predictions of fate and transport significantly less uncertain. The RI's model-based target cleanup levels for soil vapor should therefore be termed "preliminary," and the measure of success of the soil vapor removal (and hence the PRG) should ultimately be based on groundwater concentrations. Monitoring of both the vadose zone and groundwater should be linked for the purposes of this remedial effort.

4. Off-gas treatment options are discussed in greater detail in the draft final FS. Although the discussion implies that cost, effectiveness, and implementability are approximately the same for catalytic oxidation and carbon adsorption, it appears that the former has been preferred primarily for its ability to destroy contaminants, rather than simply to remove them from the air stream. From the data presented it would appear that carbon treatment is more cost efficient initially, while at some point in the future, the benefits to catalytic oxidation overcome carbon's initial advantages. An analysis in the RD documentation showing the break-even point may help clarify the decision.

5. Air emissions from an off-gas treatment system have been analyzed in the FS using a model described in Section 2.7 and Appendix C. The standard Pasquill-Gifford equation for dispersion of a gas from a continuous source is used, but the statement that the maximum downwind air concentration at ground level occurs where σ_z (the vertical dispersion coefficient) is equal to the stack height divided by 1.414 appears to be based on a differentiation of the Pasquill-Gifford equation with respect to σ_z, and assumes that all other parameters are constant.

This statement does not seem to be accurate, since the purpose of this analysis should be to find the maximum with respect to x, or distance downwind. Both σ_z and σ_y (the lateral dispersion coefficient) are functions of x, and these functions are variable depending on the stability class assumed. An alternative method to find the maximum with respect to x is to assume stability class A (unstable) and use the functions for σ_z and σ_y in terms of x to plot the concentration downwind. The maximum may be roughly located and quantified from such a graph. Stability class A will give the greatest potential air concentration, although it will show it closer than any other stability class. Using this air concentration for human exposure will be conservative, but defensible. Air emissions from the

selected off-gas treatment system and from the vadose zone during construction, start-up, and operation of the system, should be further evaluated in the RD.

SPECIFIC COMMENTS

1. Volume I, Section 5.3.1, pages 5-13 and 5-14

EPA comment 3 on the draft RI/FS report states that the field data do not support model predictions of vapor transport to the SRPA. The response to EPA's comment states that data from wells M4D and M10S indicate that vapor transport to the SRPA is potentially important. The data for those wells shown in Figures 5-11 and 5-36 of Volume I, however, do not support the statement. Figure 5-11 shows a detection of carbon tetrachloride in well M10S at approximately 300 feet below ground surface (bgs), but no detections (or no data; see comment on Figures 5-11 and 5-36) between 300 feet bgs and the SRPA. Figure 5-11 also shows a detection of carbon tetrachloride in well M4D approximately 30 feet above the SRPA, but no detection (or no data) between that depth and the perched groundwater at 240 feet bgs. Figure 5-36 shows a similar pattern of detections and no detections (or no data) for TCE at the same wells.

As stated in the comment on Figures 5-11 and 5-36, it is not clear if data from additional sampling ports between the 240-foot interbed and the SRPA showed no detections or if data was unavailable. If the data show no detections, we might very well conclude that we currently lack a significant contaminant migration pathway via the vapor phase between the 240-foot interbed and the SRPA. If the additional data are unavailable, then the existing data are insufficient to determine the significance of such a pathway. The data presented on Figures 5-11 and 5-36 should be clarified, and a conceptual model of contaminant migration that is consistent with those data should be presented in early RD documents. Any uncertainties in the conceptual model should be identified, and interpretations should consider that the detections of contaminated soil vapor within approximately 30 feet above the top of the SRPA could be due to volatilization of contaminants from the SRPA.

DOE's response also states that calculations based on carbon tetrachloride concentrations from well M4D indicate that the downward vapor flux to the SRPA could be on the same order as the total flux predicted by the model. These calculations should be provided in the RD documents.

{In addition, there appears to be a misunderstanding regarding EPA's comment 6 on the draft RI/FS report, which states that contamination is likely being transported from the source to the SRPA by both vapor- and aqueous-phase processes. Vapor-phase transport is believed to be important from the source to the 240-foot interbed but, as explained previously, may not be important between the 240-foot interbed and the SRPA. Aqueous-phase transport is probably important throughout.}

2. **Volume I, Section 5.3.1.4, Figure 5-11, page 5-36 and Figure 5-36, page 5-71**

These figures show vertical profiles of soil vapor concentrations for carbon tetrachloride (Figure 5-11) and trichloroethylene (TCE) (Figure 5-36). There are no data shown for many vapor sampling locations, and it is not clear if contamination was not detected, or if data are unavailable for these sample locations.

3. **Volume I, Section 7.1.2.3, page 7-7**

EPA comment 10 on the draft FS report stated that the presence of nonaqueous-phase liquids (NAPL) should be determined. The response to the comment states that the presence of NAPL can be verified only by drilling into the pits, and that this was not part of the final work plan. The response further states that the pit 9 action may provide information on the existence of NAPL. The RD documents for OU 7-08 should acknowledge the concern regarding the potential presence of NAPL, and the issue should be additionally addressed as part of the pits and trenches operable unit.

4. **Volume III, Section 2.2.2, page 2-10 (former comment number 26)**

The draft FS attempted to calculate the volume and areal extent of contamination that requires removal, and to estimate the remedial timeframe. The draft final FS, however, omitted these estimates, and stated that contaminant volumes and cleanup timeframes were not calculated because of a general lack of reliable information. The text then states that the extent of contamination is defined by the extent of contamination above PRGs and bounded by the volume of waste originally disposed of. Although the Agency agrees that there is considerable uncertainty srrounding the vadose zone source term, as part of the RD/RA effort we should attempt to improve our estimates of areal extents, volumes, and time-to-cleanup.

5. **Volume III, Section 4.2.2, pages 4-26 to 4-29**

The FS includes a listing of RCRA ARARs for OU 7-08. The listing appears to be focused on waste residuals that may be generated subsequent to vapor treatment. The vapor treatment system itself, however, may also be subject to RCRA regulations. Requirements from 40 CFR 264.600 should be added to the proposed plan's list of potential ARARs.

6. **Volume III, Section 4.2.4.3, pages 4-36 and 4-37 (former comment number 37)**

A by-product of the catalytic oxidation of chlorinated hydrocarbons is HCl. Calculations in the FS have been presented to show that HCl generated during vapor treatment will be below levels necessitating acid neutralization (such as a scrubber). For the purposes of evaluating alternatives, and estimating reasonable costs, EPA accepts the FS presentation. The Agency expects that this issue will be re-visited as part of the RD, however, and that a more rigorous examination of HCl generation will be undertaken at that time.

In addition, in refining the costs for the catalytic oxidation unit, it should be anticipated that acid-resistant materials will be required for the unit's construction, and higher material costs may result.

7. **Volume III, Appendix A, Alternative Cost Comparison**

The following "discrepancies" should be noted:

- The footnote at the bottom of the first page states that all costs represent 1994 dollars. In Section 4.2.7.1 (page 4-49), the text states that all anticipated future expenditures are discounted to 1993 dollars.

- The net present value in the line item costs appears to be incorrect based on a 5 percent discount rate.

- Although it is a common RCRA post-closure monitoring interval, and perhaps a good basis for making cost estimates, the assumption of 30-years of "post-closure" monitoring is not explained for alternatives 2 (phases 1, 2, and 3) and 3. The monitoring interval proposed in RD documents should account for: a) a remedial alternative designed and operated to meet the cleanup levels within 6 years (if either Alternative 2 or 3 are the selected alternative); b) the expected travel time for anticipated peak concentrations to reach the SRPA; and, c) any RCRA ARARs.

8. **Volume III, Appendix A, Alternatives 1, 2 (Phases 1, 2, and 3), and 3**

The following operation and maintenance (O&M) indirect costs are included in alternatives 1, 2, and 3:

Construction management	22 percent of O&M direct cost
ED&I (not defined)	28 percent of O&M direct cost
Project management	20 percent of O&M direct cost

Indirect costs are generally added to construction, but not to O&M costs. Because substantial O&M indirect costs are added, the assumption applied to O&M indirect costs for the selected alternative should be further explained in the RD documentation.

9. **Volume III, Appendix A, Alternatives 2 (Phases 1, 2, and 3) and 3**

The following items do not appear to be included in the estimate of direct construction costs:

- Blowers
- Pretreatment systems for soil vapor such as heat exchanger and air/water separator
- Piping, valves, and flow meters
- Pumps, if any

These omissions should be corrected (as necessary) in the RD documentation and the estimated cost should be revised. The basis for the assumption of the total number of vapor samples for each alternative should be explained as well.

REFERENCE

P.C. Johnson et al. 1990. A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil-Venting Systems. In Groundwater Monitoring Review. Spring.